Intel 300mm Program Briefing
May 11, 2001

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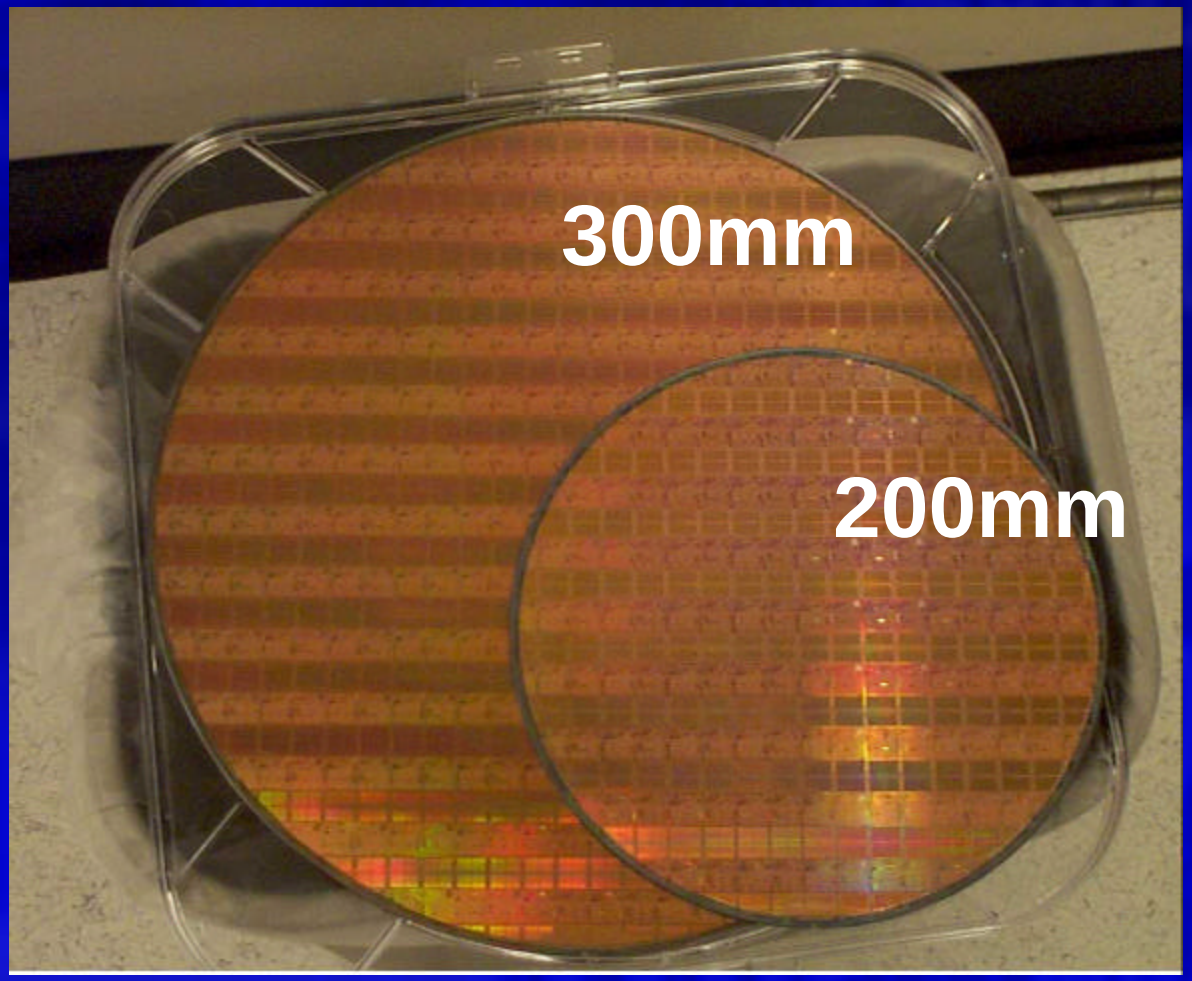
First functioning 0.13µm 300mm wafers



March 2001
D1C

SRAM
Test Vehicle

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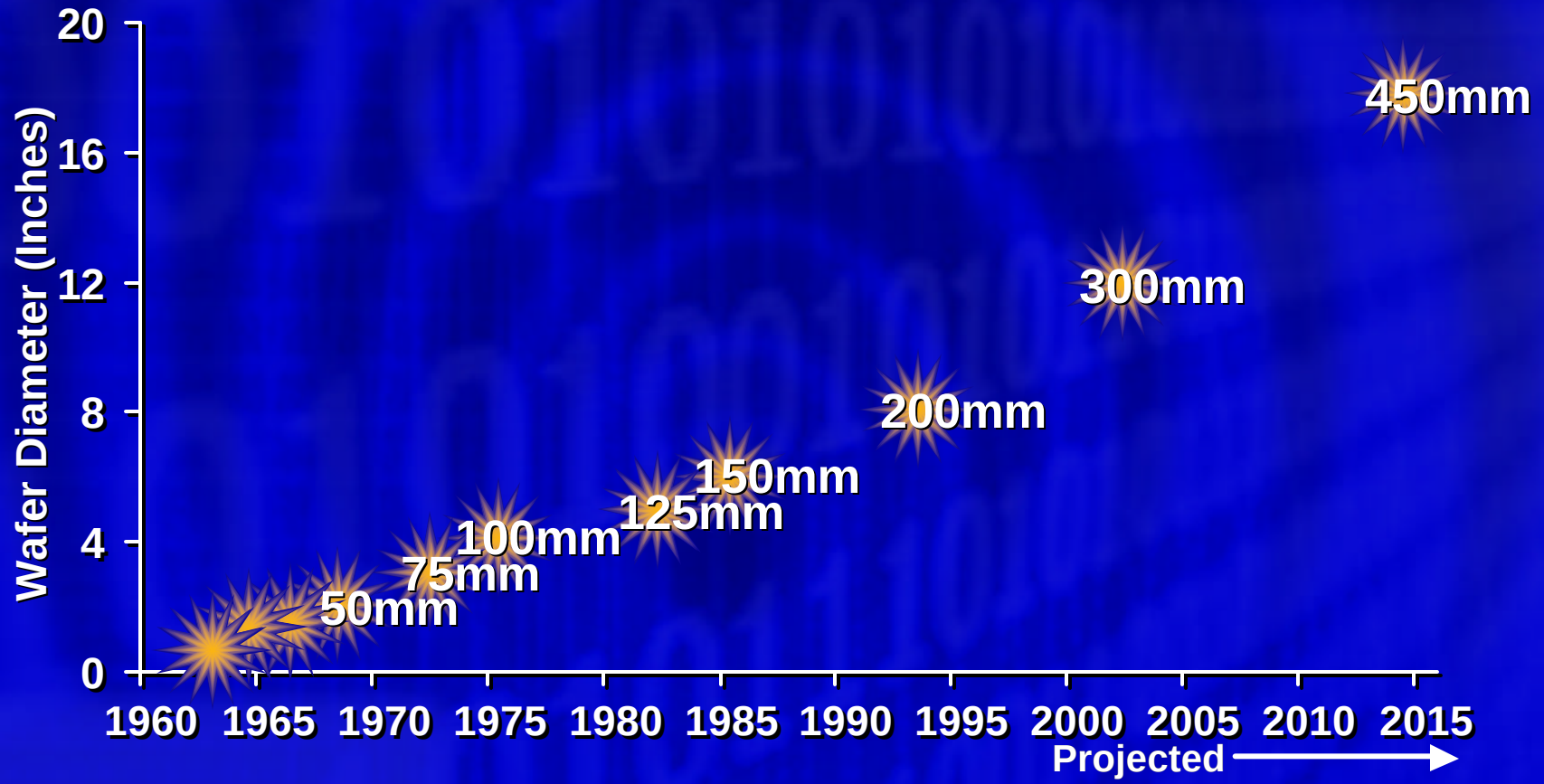
Wafer Size Transitions



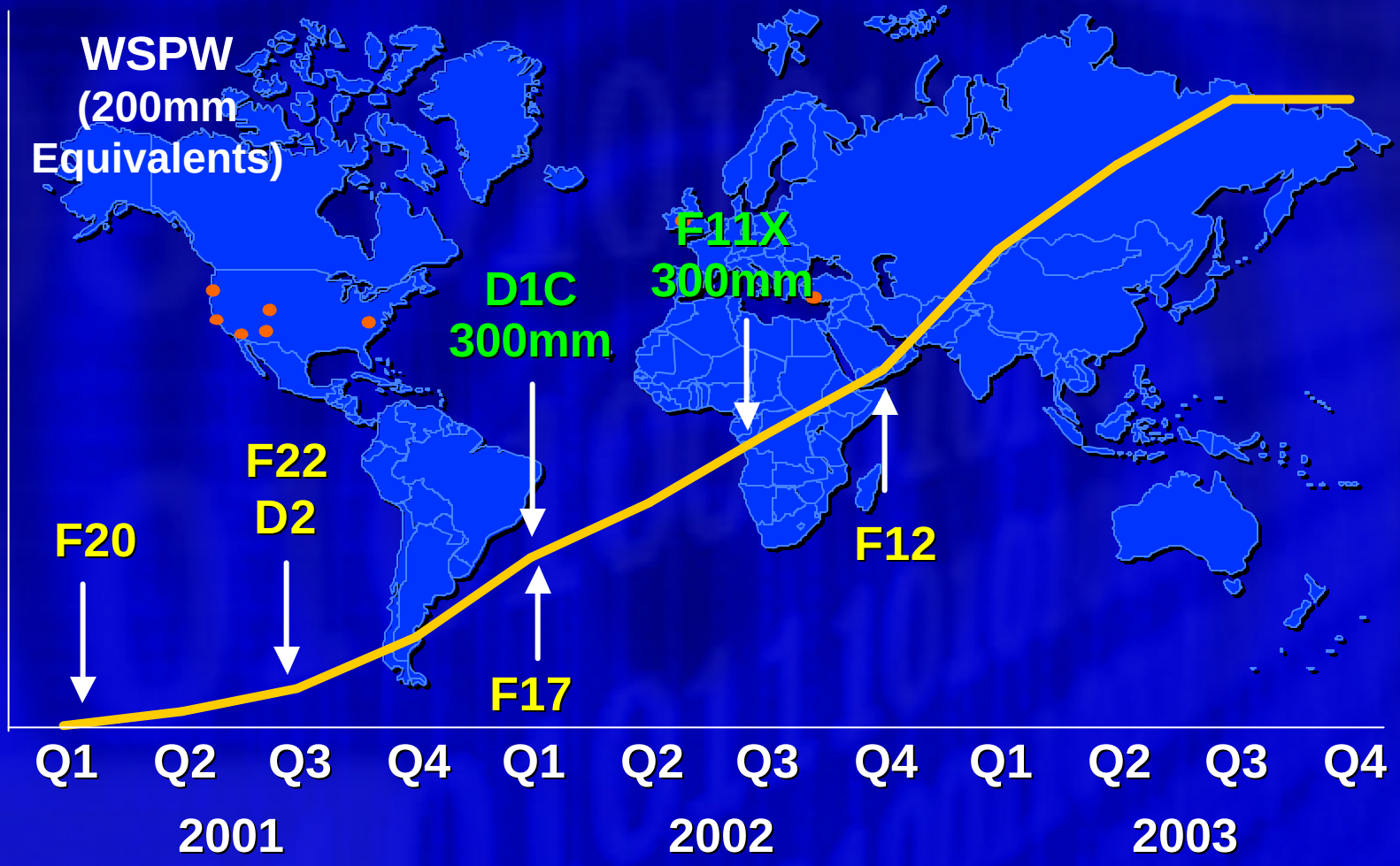
Year That Industry Wafer Starts Exceed 3 Million Units

Source: VLSIR

Intel's D1C, the world's first 0.13µm 300mm factory, produced its first devices

- D1C started pilot line operations in Q4'00
- Functioning devices in March 2001
- Production ramp to start in early 2002
- The second 300mm factory, Fab 11X in New Mexico, follows D1C production in 2002
- These 300mm factories will greatly increase Intel's CPU output, while reducing costs and environmental impact

0.13µm Process Ramp in 7 Factories



The Mechanized Factory

- The conversion to 300mm wafers compels a change to fully automated material transport throughout the factory
- The size of the wafer carrier (FOUP*) necessitates the use of tall (20ft) stockers to conserve space
- A multilevel material transport system using monorails and an overhead vehicle system (OHV) is used to move wafers throughout the factory and deliver direct to tools

* FOUP- Front Opening Unified POD

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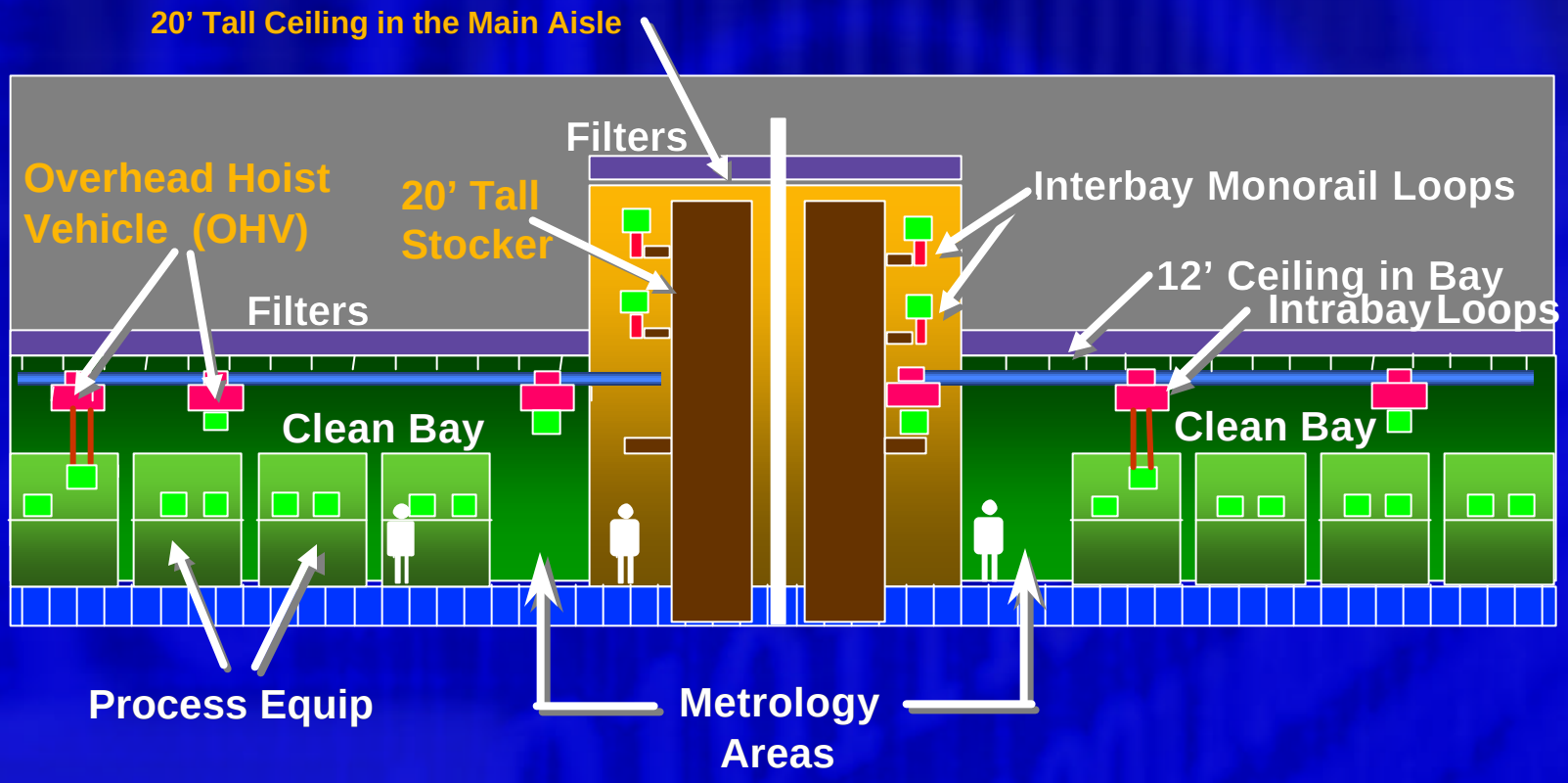
Multilevel AMHS

New Fab Design



*AMHS- Automated Material Handling System

Intel leads 300mm automation

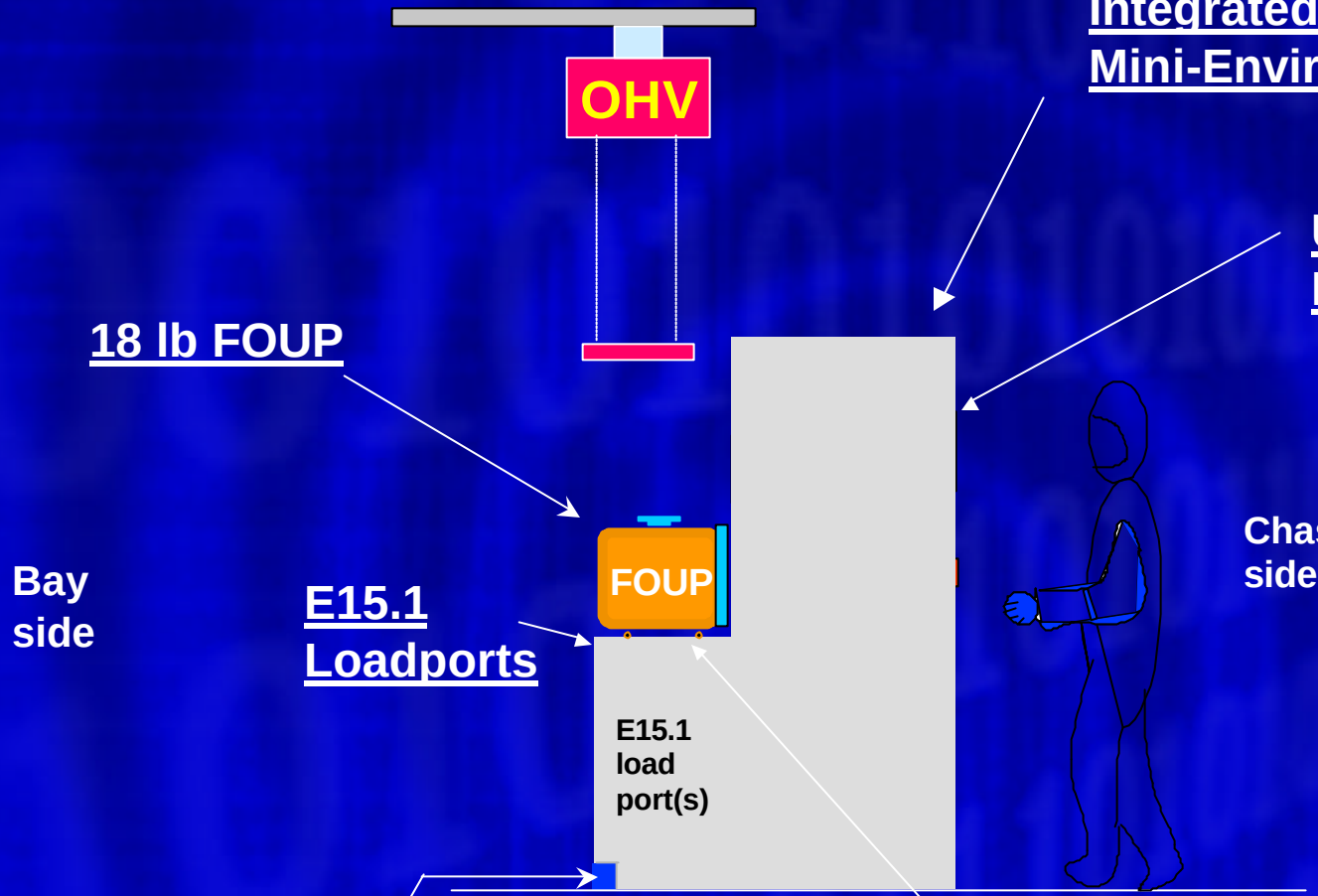
Multilevel automated material handling system

Overhead hoist vehicle (OHV) and “FOUP” (wafer box)

The Mechanized Factory

- All tools are designed with mini-environments and common load-port interfaces to facilitate FOUP loading and unloading by the OHV system
- The OHV system allows lots to not only move faster but enable use of narrower bays
- OHV necessitates precise placement of tools
- The D1C factory displays a unique combination of multi-level automation and narrower bays combined with high-precision tool placement

Mini-Environment and OHV



Integrated Mini-Environment

U/I Controls/ Display Console

18 lb FOUP

Bay side

E15.1 Loadports

Chase side

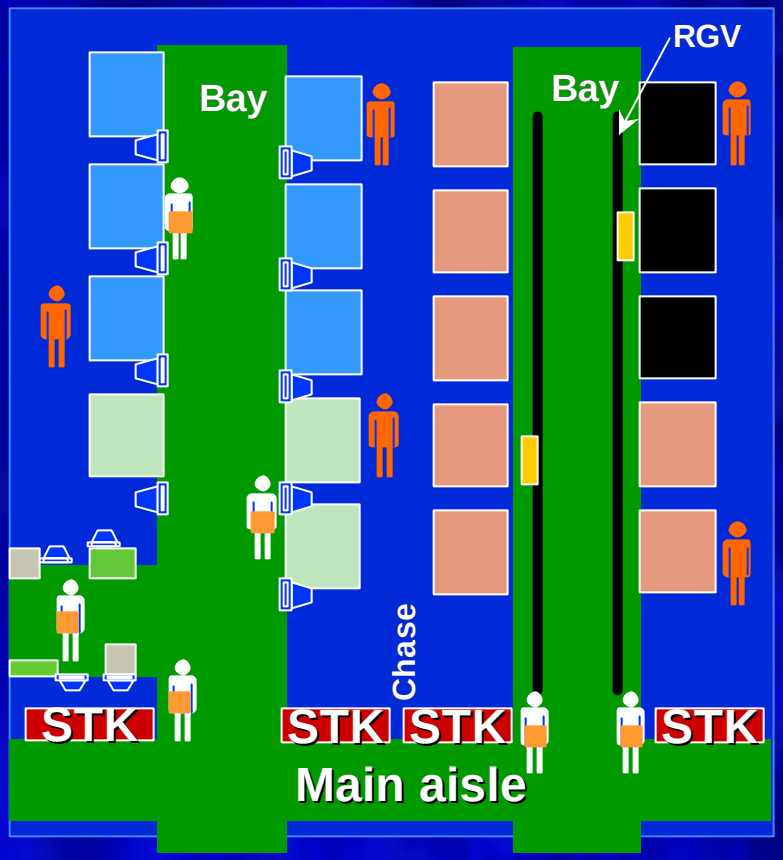
PGV Docking

Lockout Pins/Pads

Components must interoperate

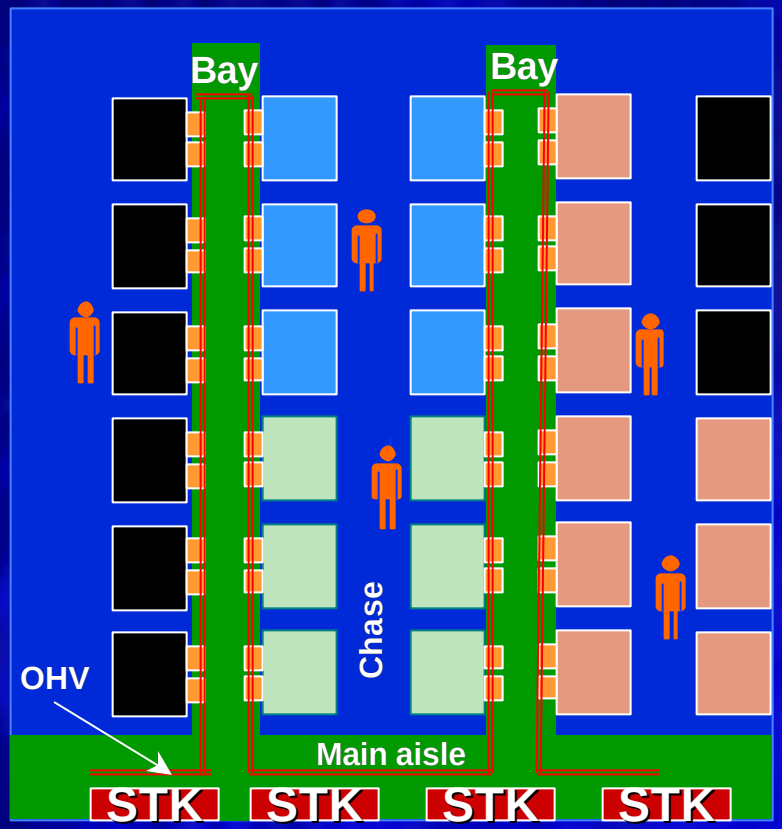
HVM Layout Differences

200mm



- Manual wip movement and RGV
- Wider bays for MT's.
- WIP racks, workstations in bays

300mm



- 100% OHV automated material handling
- Narrow bays; MT's in the chase.
- Command centers for WIP movement.

Intel's 300mm factories will be fully automated in manufacturing

- First fully automated material handling system on 300mm
- Integrated material scheduling & movement
- Fully web-enabled decision support systems
- Remote e-diagnostic capability

Moore's Law + 300mm Wafers = 4x advantage

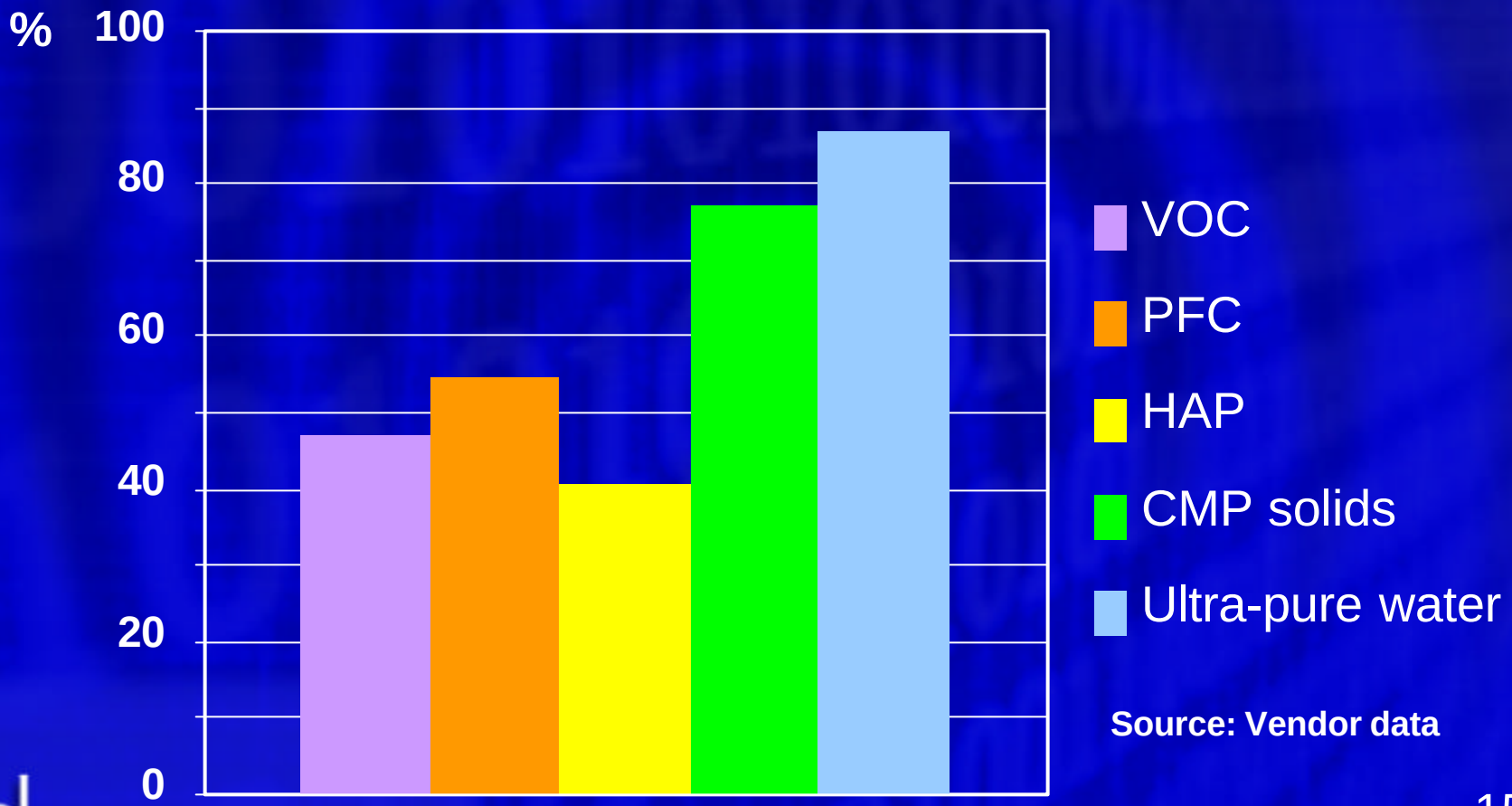
- Moore's Law:
  - From 0.18 µm to 0.13 µm = 2x output
- 300mm Wafers:
  - From 200 mm to 300 mm = 2x output
- Combined output advantage:
  - 4x output

300mm: lowers production cost and environmental impact

- Conversion to 300mm at the 0.13µm technology generation makes it 4X more productive than the previous generation
- All future logic technology development will be on 300mm wafers
- 300mm factories will be the most environmentally effective in the company

300mm is environmentally friendly

Estimated 300mm emission/consumption relative to 200mm (per IC processed)



Source: Vendor data

Intel's 300mm Plans

- **First 300mm development fab processed first silicon in Q1, 2001**
- **Conversion process development in 2001**

- **0.13µm production ramp on 200mm in 2001, on 300mm in 2002**

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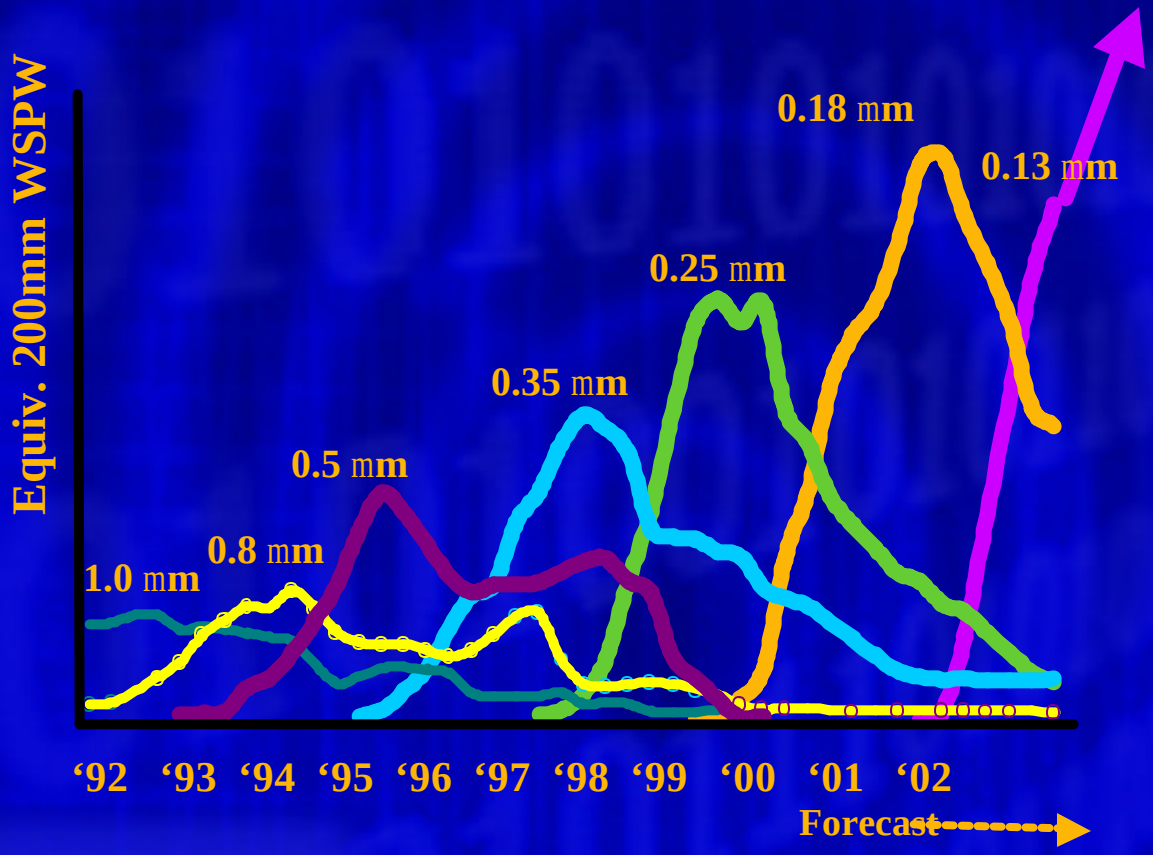
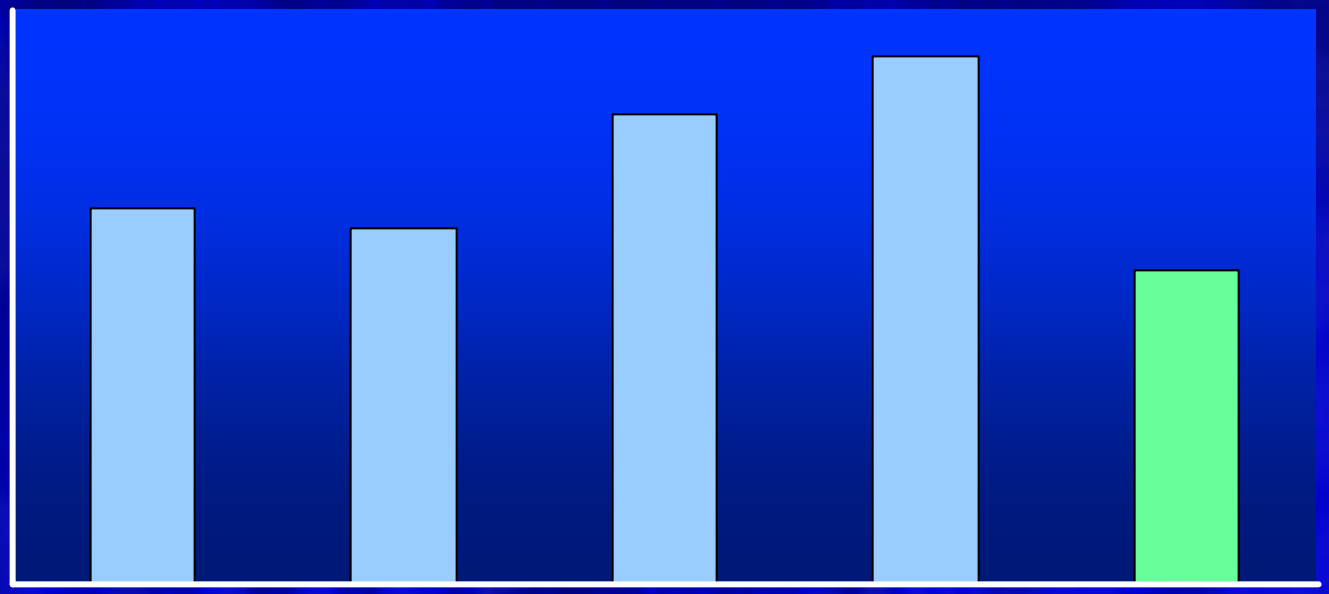
300mm on 0.13µm - Why?



300mm Rolls Cost Back

Capital cost per unit wafer area



0.35µm 0.25µm 0.18µm 0.13µm 0.13µm

200mm → 300mm

1/2x transistor cost while doubling its performance

- We expect this trend to continue due to:
  - Moore's Law
  - Bigger wafers
  - Fully automated 300-mm factories
- This translates to our long-term historic trend of 30% cost reduction per transistor per year

Intel's first 300mm technology

	P648	P650	P852	P854	P856	P858	P860/P1260
Production	1989	1991	1993	1995	1997	1999	2001/2002
Generation	1.00	0.80	0.50	0.35	0.25	0.18	0.13 mm
Gate Length	1.00	0.80	0.50	0.35	0.20	0.13	0.07 mm
SRAM Cell	220	111	44	21	10.6	5.6	2.09 mm2
Power Supply	5.0	5.0	3.3	2.5	1.8	1.5	1.3 volts
# Metal	2	3	4	4	5	6	6 (Copper)

New generation every 2 years –
Technology & Manufacturing Leadership

Summary

- Intel is the first to demonstrate fully functional circuits on a 0.13µm generation technology on 300mm wafers
- 4X gain in productivity (vs. 200mm, 0.18µm current generation)
- 300mm fabs will be the most productive in the industry in terms of manpower, and manufacturing capacity
- Larger wafers will diminish overall use of resources and wasted material
- All future process technologies, 0.13µm and beyond, will be developed on 300mm wafers

For more information visit Silicon Showcase at www.intel.com/research/silicon

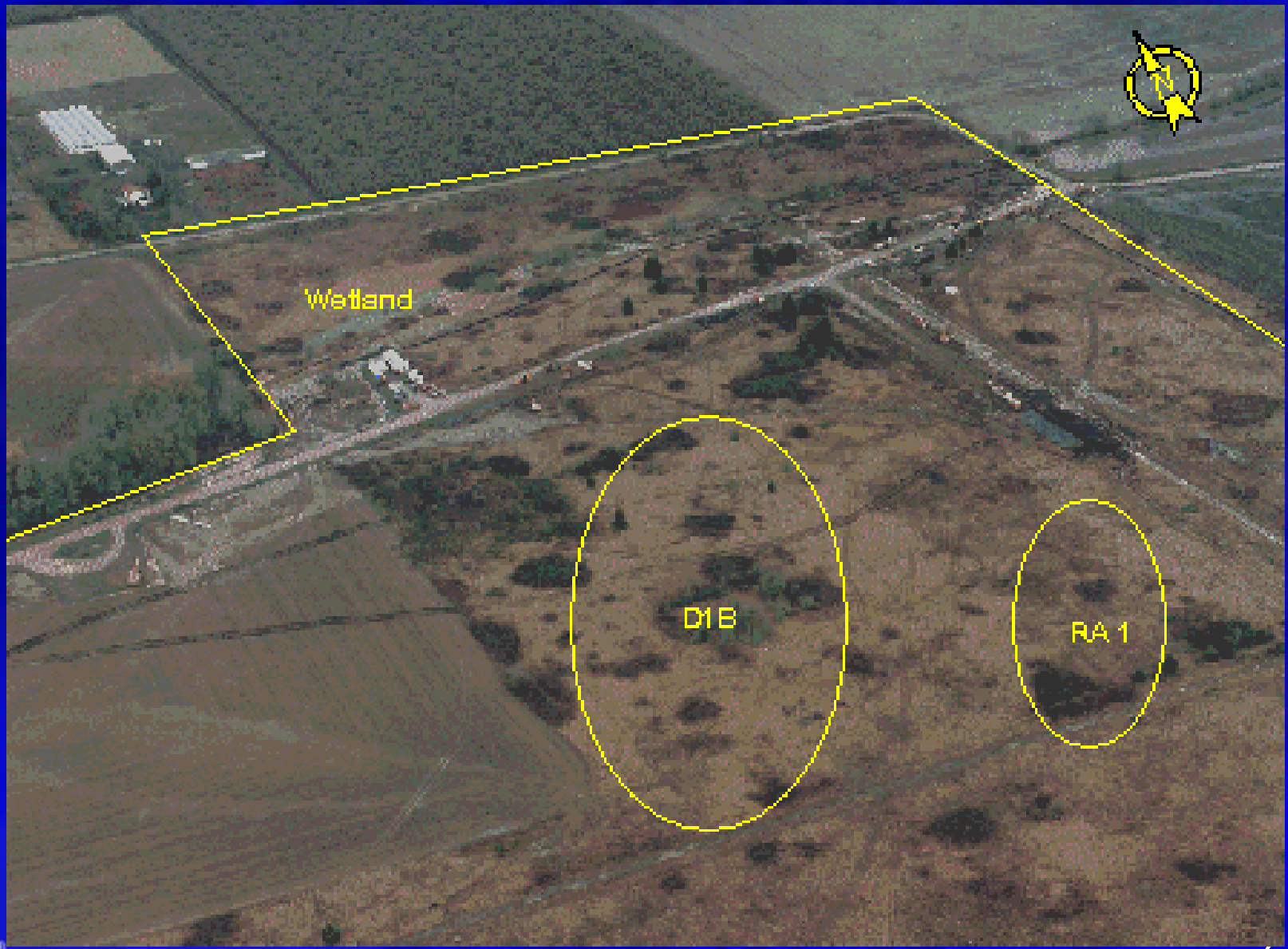
Appendix

Intel's Manufacturing Sites

Ronler Acres Site Introduction

- Site Prep work started in 1994
- D1B Construction/startup Completed 10/96
- RB1 Building Added in 1997
- D1C Construction/startup Completed 3/01
- RP1 Startup Currently in process

RONLER ACRES SITE
BEFORE CONSTRUCTION 1994



MARCH 1995 D1B

Ronler Acres 1996

RONLER ACRES OCTOBER 1997

Ronler Acres 2001